

TRIGEN[◇]
META-NAIL[◇]

Semi-extended Instrument Set

Including

TRIGEN[◇]
SURESHOT[◇]

Distal Targeting System



TRIGEN[◇] META-NAIL[◇] Semi-extended Instrument Set

Surgical Technique

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Nota Bene

The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.

The technique is based on the tibial nailing approach outlined in the article below:
Tornetta P, 3rd, Collins E. Semiextended position of intramedullary nailing of the proximal tibia.
Clin Orthop Relat Res. 1996: Number 328, pp 185-189.

Indications

The TRIGEN® META-NAIL® Tibial Nail is indicated for fractures of the proximal and distal third of the tibia, including the shaft, stable and unstable fractures, nonunions, malunions and for the prophylactic nailing of impending pathological fractures.

Note This technique deals with the joint space around the knee. Caution must be taken at all times during the procedure. The Entry Tube is needed for guide pin placement, reaming, measuring, fracture reduction, and insertion of the guide rod. Please be aware there is a possibility of damaging the posterior aspect of the patella and the surrounding tendons if care is not taken.

The TRIGEN META-NAIL Semi-extended Instrument Set has been designed with these concerns in mind.



TRIGEN[®] SURESHOT[®] indications

Legend

Important warnings appear in orange

Tips, tricks and important information appear in blue

Indications, contraindications, intended use and training

The Smith & Nephew TRIGEN[®] SURESHOT[®] Distal Targeting System is intended to be an intraoperative image-guided localization system. It is a computer-assisted orthopaedic surgery tool to aid the surgeon with drill positioning for screws during intramedullary nail implantation. It provides information to the surgeon that is used to place surgical instruments during surgery utilizing intraoperatively obtained electromagnetic tracking data. The Smith & Nephew TRIGEN SURESHOT Targeting System is indicated for long bone fractures treated with intramedullary nails in which the use of stereotactic surgery may be appropriate.

An example of a surgical procedure includes but is not limited to locating and drilling the distal holes in an intramedullary nail.

Contraindications

The screw targeting software application for this system is contraindicated for all IM nails other than Smith & Nephew TRIGEN META-NAIL[®], TAN[®], FAN, Humeral, Pediatric and Adolescent nails. Do not operate the TRIGEN SURESHOT Targeter within 200mm of an installed pacemaker. The magnetic field produced by the Targeter may interfere with the operation of the pacemaker.

Intended use

The TRIGEN SURESHOT Distal Targeting System is only designed for use with the indicated implants and instruments. Implants and instruments must be used in accordance with the instructions, as described in this manual and/or in the non-navigated surgical procedure.

Training

Only trained operators are allowed to use the TRIGEN SURESHOT Distal Targeting System. The various operating instructions must be fully read and understood as part of the training. If any part of the instructions is unclear, please contact your local Smith & Nephew representative.

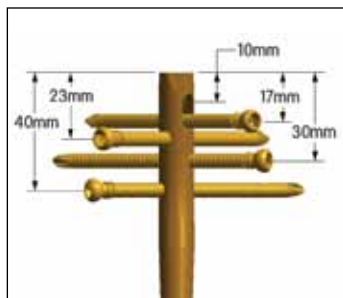
Plausibility check

As with all technical equipment, malfunctions may occur due to improper use or, more rarely, technical failure. To reduce the risks involved with such technical malfunction the operation can be completed using manually controlled instruments, providing the malfunction is detected without delay.

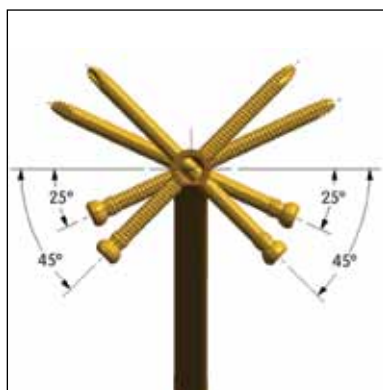
It is, therefore, important to check the plausibility of the steps, as indicated by the system, and to carry out verification of the software targeting, particularly when using the system for the first time. Should there be any doubt regarding correct functioning, the targeting should be verified or a switch made to a traditional X-Ray technique.

Refer to the SURESHOT User Manual (7118-1540) for details about the SURESHOT Distal Targeting System.

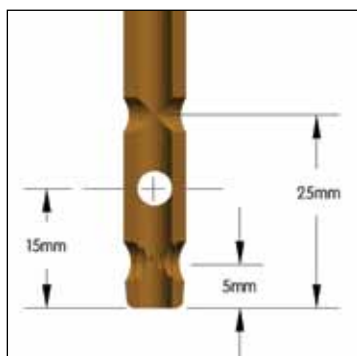
TRIGEN[◇] META-NAIL[◇] Tibial Nail Specifications



Distal end of nail (all knee and distal tibial)



Top view of nail



Non-driving end of nail (AP view)

Note: These views are not to scale and should be used as a pictorial representation only.

Specifications	TRIGEN META-NAIL Tibia (8.5mm)	TRIGEN META-NAIL Tibia
Material	Ti6AL4V	Ti6AL4V
Diameter	8.5mm	10, 11.5 & 13mm
Lengths	16-50cm*	16-50cm*
Nail color	Grey	Gold
Cross section	Round	Round
Proximal diameter (driving end)	12mm	12mm (10, 11.5 dia.) 13mm (13 dia.)
Distal diameter (non-driving end)	8.5mm	10, 11.5 & 13mm
Smallest thru diameter	4.8mm	5.0mm
Wall thickness	1.9mm	2.3mm (10) 3.0mm (11.5) 2.3mm (13)
Guide bolt thread	5/16-24 UNF	5/16-24 UNF
Screw diameter	4.5mm	5.0mm
Screw color	Grey	Gold
Major diameter	4.5mm	5.0mm
Minor diameter (core)	4.0mm	4.3mm
Screw lengths	25-65mm	25-110mm
Hex size	4.7mm	4.7mm
Alternative Hex Drivers	RT Femoral & Recon 7.0mm Cannulated Screw PERI-LOC [®] Locking Screw	RT Femoral & Recon 7.0mm Cannulated Screw PERI-LOC [®] 4.7mm Hexdriver, PROFIX [®] 4.7mm Hexdriver
Alternative modes	No	No
Proximal Locking (Driving End)		
Static lock locations/orientations	17mm/45° Screw Locked w/META-NAIL Cap 23mm/45° Threaded w/bushing 30mm/25° Threaded 40mm/25° Threaded	
Static Locking Hole	Threaded 4.3mm minor dia.	Threaded 4.5mm minor dia.
Dimensions	Threaded 4.7mm major dia.	Threaded 5.3mm major dia.
Compression/Dynamic	10mm	10mm
Slot Location		
Compression/Dynamic	4.7mm/7mm	5.3mm/7mm
Slot Diameter/Length		
Degree of Proximal	10°	10°
Bend (Herzog)		
Proximal Bend Location	27mm	27mm
Distal Locking (Non-driving End)		
Static Lock Locations/Orientations	25mm/ML 15mm/AP	25mm/ML 15mm/AP
Static Locking Hole	5mm/ML (Threaded) 4.7mm**	5mm/ML (Threaded) 5.3mm**
Dimensions		
Degree of Distal Bend	2°	2°
Distal Bend Location	60mm	60mm

* Set does not include all sizes.

** Most distal hole threaded.

Surgical Technique

Patient positioning

Position the patient supine on a radiolucent table with the unaffected limb extended away from the affected limb.

There should be approximately 10–20° of flexion.



Assemble the Entry Tube (7165-4526) to the Entry Portal Handle (7167-4092) by pulling back the black trigger of the Entry Portal Handle and inserting the Entry Tube into the handle ring.

Turn the tube until it clicks into a locked position.

Next, place the Guide Pin Sleeve (7165-4527) through the tube until it locks into both the end of the sleeve and Entry Portal Handle ring.

Note Take time to inspect the Entry Tube as it can become damaged, bent or chipped with excessive prior reaming and insertion of other instruments. Any flaws in the tube can lead to damage of the surrounding tendons and tissues.



Warnings and cautions for TRIGEN[®] SURESHOT[®]

Refer to the SURESHOT User Manual (7118-1540) for all warnings, cautions, maintenance, cleaning and sterilization instructions.

Devices for system set up



Trauma Interface
Cat. No. 7169-2802

Power Cord
Cat. No. 6680-0193



TRIGEN[®] SURESHOT[®] Targeter
Cat. No. 7169-2801

Note The Targeter will be operated within the sterile field and may have contact with the skin of the patient. The drill sleeve inserts will be used in the incision and have direct bone contact.

Note Verify that the Targeter housing is not damaged (holes, tears, cracks). If the housing or the connector is damaged, the Targeter is no longer safe to use.

Note If the Targeter is not recognized after connection to the system, the Targeter is defective and must be exchanged. (See also instrument connection).

Note Broken or damaged instruments must be exchanged immediately and sent back to Smith & Nephew, Inc.

Note This device is provided non-sterile and must be cleaned and sterilized per Cleaning and Sterilization (Smith & Nephew document 7138-1339) prior to use.

WARNING: The maximum temperature of the Targeter body can reach 47° Celsius at ambient room temperatures above 30° C. The Targeter body should not remain in constant contact with a patient's exposed skin for more than one minute.

Surgical procedure – OR preparation

Trauma Interface setup

After the sterile areas have been established, place the Trauma Interface (7169-2802) in the desired non-sterile location and turn on the power switch.



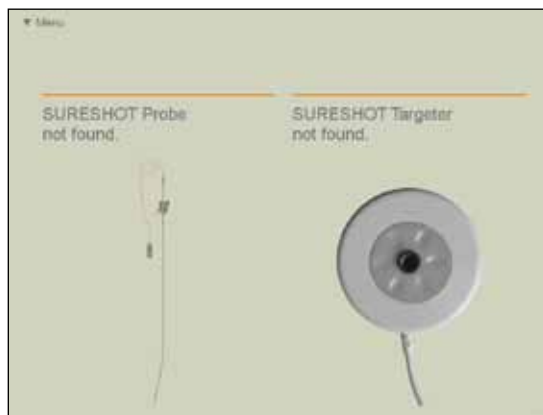
CAUTION: No other electrical devices should be placed near the Trauma Interface. See the “Guidance and Manufacturer’s Declaration – Separation Distances” table at the end of this document.

Note If the Trauma Interface does not power on, make sure the switch is in the “on” position.

Note The means for mains disconnection of power to the Trauma Interface is the appliance inlet located below the power switch. The Trauma Interface should not be positioned such that it is difficult to reach this location.

TRIGEN® SURESHOT® Targeter connection

When the display prompts for tool connections, connect the TRIGEN SURESHOT Targeter (7169-2801) to the Targeter port on the Trauma Interface.



Surgical procedure – OR preparation



The SURESHOT® Targeter will change color to orange upon successful connection to the Trauma Interface.

CAUTION: The Targeter body may have contact with the patient and must remain in the sterile field at all times. Only the cable and connector may be removed from the sterile field.

CAUTION: Connect the Targeter at least 10 minutes prior to targeting in order to ensure proper accuracy.

Note When oriented as shown, the connector should assemble easily. Do not force the connector into the port.

Note If the Targeter is properly connected to the system and the application remains in this screen for more than 30 seconds, the Targeter may have been damaged during cleaning/sterilization. In this case another Targeter has to be used.

Note It is possible at any time to disconnect and reconnect tools when the application is running. The display will show a screen reporting the missing instrument.

Instruments for opening the proximal tibia



3.2mm Tip Threaded Guide Wire
Cat. No. 7163-1690



12.5mm Entry Reamer
Cat. No. 7163-1116



Entry Portal Handle
Cat. No. 7167-4092



3.2mm T-handle Trocar
Cat. No. 7167-4074



Cannulated Awl
Cat. No. 7167-4000



T-handle
Cat. No. 7167-4076



Mini Connector
Cat. No. 7163-1186



Guide Pin Sleeve
Cat. No. 7165-4527



Entry Tube
Cat. No. 7165-4526

Incision and entry point: Lateral subluxation of the patella

A midline skin incision is made from the upper pole of the patella to the middle of the patella approximately 1.5 inches in length.



A second deep incision is made medial to the patella, cutting the superior two-thirds of the medial retinaculum leaving the cuff intact.

Extend the incision 1-2 cm into the quadriceps tendon. This incision is not midline, but through the medial one-third of the quadriceps tendon as outlined in the image.



Sublux the patella laterally and pass the fully assembled entry tube through the skin incision until it is sitting on the tibial plateau.

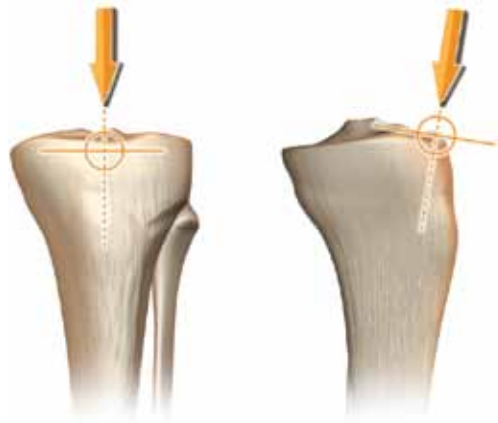


Entry portal acquisition

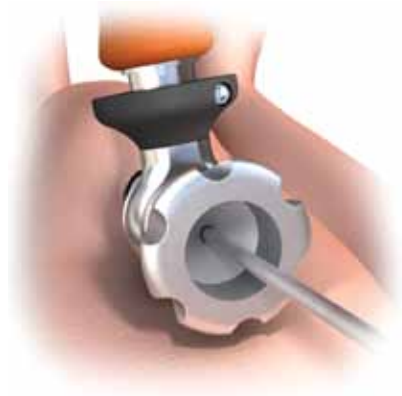
Use the femoral condyles as a guide for proper tube placement making sure the Guide Pin Sleeve sits properly as outlined below.



The entry point is located just medial to the lateral tibial eminence in the AP view and in line with the anterior cortex and intramedullary canal in the lateral view.



Attach the 3.2mm Tip Threaded Guide Wire (7163-1690) to the drill via the Mini Connector (7163-1186) and insert into the Guide Pin Sleeve.



Entry portal

After definitive guide wire placement, remove the Guide Pin Sleeve and carefully slide the Entry Tube down and onto the tibial plateau.

Attach the 12.5mm Entry Reamer (7163-1116) to power. Advance over the guide wire through the Entry Tube to a depth of 4–6cm in the tibia. Maintain alignment so as to avoid penetration of the posterior cortex.

Check position via radiographic imaging and then remove the 12.5mm Entry Reamer and 3.2mm Tip Threaded Guide Wire.



Alternative technique: Entry portal

With the Entry Tube and Entry Portal Handle still in the joint space, attach the T-handle (7167-4076) to the Cannulated Awl (7167-4000) and insert into the proximal tibia to a depth of 4–6cm. Introduce the 3.2mm T-handle Trocar (7167-4074) into the back of the assembly prior to insertion in order to prevent awl slippage and accumulation of cortical bone within the cannulation.



3.2mm T-handle Trocar
Cat. No. 7167-4074



Cannulated Awl
Cat. No. 7167-4000



T-handle
Cat. No. 7167-4076



Entry Portal Handle
Cat. No. 7167-4092



Entry Tube
Cat. No. 7165-4526

Instruments for fracture reduction and reaming



Entry Tube
Cat. No. 7165-4526



Entry Portal Handle
Cat. No. 7167-4092



Ruler
Cat. No. 7167-4079



T-handle
Cat. No. 7167-4076



Gripper
Cat. No. 7167-4080



Reamer Heads
Cat. No. 7111-8231-8246



3.0mm x 1000mm Ball Tip Guide Rod
Cat. No. 7163-1626



Obturator
Cat. No. 7167-4078



Flexible Reamer Shaft
Cat. No. 7111-8200



Reducer
Cat. No. 7167-4077

Fracture reduction

Insert the back end of the 3.0mm Ball Tip Guide (7163-1626) into the front of the Gripper (7167-4080) and gently close the trigger grip.

Connect the Reducer and Reducer Connector (7167-4077) so that the words "Slot Orientation" are in line with the opening at the tip. Complete the assembly by connecting it to the T-handle (7167-4076).



Advance the Reducer into the intramedullary canal and use the curved tip to direct the 3.0mm Ball Tip Guide Rod past the fracture into the region of the distal epiphyseal scar. The guide rod should be center-center in the AP and lateral views.



Reducer removal

Once the guide rod is at the desired depth, detach the Gripper and remove the Reducer from the tibial canal. Slide the Obturator (7167-4078) into the back of the T-handle during extraction in order to maintain guide rod position within the canal.



Implant measurement

After Reducer removal, reconfirm guide rod placement within the distal tibia and slide the Ruler (7167- 4079) over the guide rod, inside the Entry Tube, to the desired depth. The metal tip of the Ruler denotes the driving end of the nail.



Confirm guide rod position in the window at the opposite end of the Ruler as shown in order to ensure accurate implant measurement. Push down on the top of the Ruler until contact is made with the 3.0mm Ball Tip Guide Rod. Implant length is read from the exposed calibrations at the end of the Ruler.

Note Confirm fracture reduction so as not to underestimate correct implant length. Reference the fibula for accurate fracture distraction or compression.

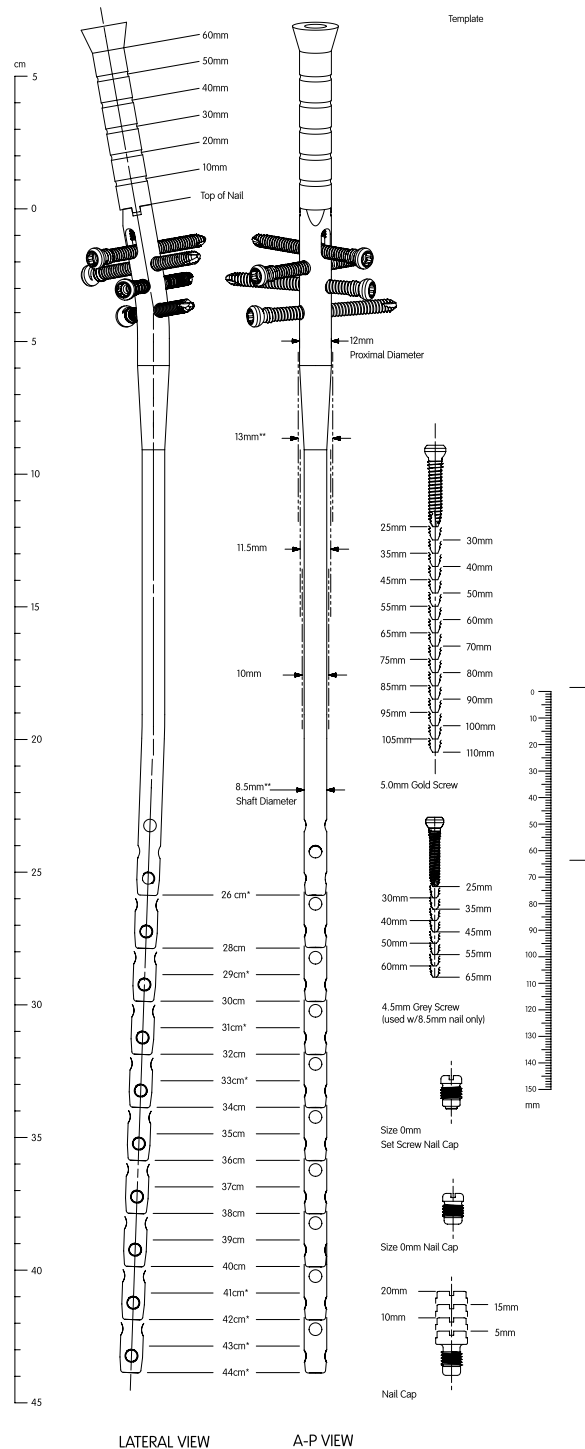
Note Confirm that the Ruler opens easily. Adjust the thumb-wheel connection at the end to allow for free movement.



Unreamed technique

Radiographic templating is used to determine nail size. The appropriate diameter implant will provide translational till within the isthmus of the intramedullary canal. Generally, selection of a nail approximately 1–1.5mm less than the narrowest canal measurement on the lateral radiograph assists in avoiding implant incarceration during insertion.

Note The 8.5mm diameter of the Reducer provides an initial “sound” for determining canal width in small diameter tibias.



TRIGEN® META-NAIL® Tibial Nail Radiographic Template
Cat. No. 7118-0810

Reamed technique

Radiographic templating and intraoperative measurement will determine nail size.

Beginning with the 9.0mm End Cutting Reamer Head (7111-8231) and Flexible Reamer Shaft (7111-8200), ream the intramedullary canal sequentially in half millimeter increments to a size 1-1.5mm larger than the selected nail size.

Ensure Guide Rod placement during reaming by inserting the Obturator into the back of the Reamer unit during retraction. Continue to confirm Guide Rod placement in the distal tibia throughout reaming. Periodically move the reamer back and forth in the canal to clear debris from the cutting flutes.



Instruments for nail assembly and insertion



META-NAIL° Anterior Drop
Cat. No. 7165-4501



Guide Bolt Wrench
Cat. No. 7163-1140



9.0mm Drill Sleeve
Cat. No. 7163-1152



4.0mm Drill Sleeve
Cat. No. 7167-4083



4.0mm Long Pilot Drill
Cat. No. 7163-1110



Cannulated Impactor-Short
Cat. No. 7165-4554



T-handle
Cat. No. 7167-4076



Semi-extended Drill Guide
Cat. No. 7165-4524



Semi-extended Guide Bolt
Cat. No. 7165-4525



Impactor
Cat. No. 7167-5081



Slotted Hammer
Cat. No. 7167-4082



META-NAIL Semi-Extended Drill Guide Probe
Cat. No. 7169-2803



META Set Stop
Cat. No. 7169-2806

Nail assembly

Attach the META-NAIL[®] Semi-extended Drill Guide (7165-4524) to the nail with the Guide Bolt (7165-4525) and tighten with the Guide Bolt Wrench (7163-1140) and T-handle. The nail is correctly aligned when:

- 1 The line on the insertion barrel matches the line of the nail.
- 2 The “A” on the nail matches the “A” on the insertion barrel.
- 3 The apex of the nail’s proximal Herzog Bend faces posterior and the drill guide is oriented anterior.

The bevel on the front of the nail marks the connection to the drill guide and can be seen in the lateral view as a means for determining proximal insertion depth.

Attach the Anterior Drop (7165-4501) to the drill guide and verify targeting accuracy by inserting a gold 9.0mm Drill Sleeve (7163-1152) and silver 4.0mm Drill Sleeve (7167-4083) into the drop and passing a 4.0mm Long Pilot Drill (7163-1110) through the assembly. An incorrectly attached nail will not target.

Note Refer to SURESHOT[®] User Manual for the field accuracy check instructions.



Surgical procedure – after IM Nail Assembly to the Drill Guide

Probe selection and assembly

Assemble the appropriate probe and set the stop for the the TRIGEN® IM Nail and Drill Guide that will be used.

CAUTION: Proper orientation of the probe to the set stop as shown is required. Failure to do so may result in inaccurate targeting.

TRIGEN SURESHOT®
META-NAIL®
Semi-extended
Drill Guide Probe
(7169-2803)



Blue probe
Use only with
META-NAIL Semi-
extended Drill Guide
(7169-2803)

Set the probe to the length of the TRIGEN IM Nail.

Probe connection

Connect the probe to either of the probe sensor ports on the Trauma Interface.



Confirm that the tool connection has been verified.

Note When oriented as shown, the connector should assemble easily. Do not force the connector into the port. Simply try rotating the connector until the keys are oriented in the 12 o'clock position.

Note If the probe is properly connected to the system and the application reports "Probe not found" for more than 10 seconds, the probe may be damaged or defective. In this case, the probe has to be exchanged.

Note It is possible at any time to disconnect and reconnect tools when the application is running. The display will show a screen reporting the missing instrument.

Surgical procedure – after IM Nail Assembly to the Drill Guide

Drill sleeve selection

Select the length of the drill sleeve (7169-2804, 7169-2805, or 7169-1165 and 7169-1166) that will be used.

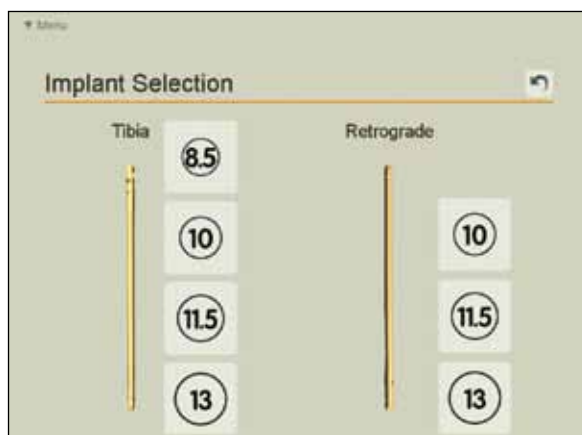


A different sleeve can be selected at any time during the procedure by choosing the drill sleeve option from the drop down menu OR by pressing the drill sleeve tab located in the lower right corner of the navigation screen.

Implant selection screen

Select the TRIGEN® IM Nail and size that will be used.

META-NAIL®



Note A different TRIGEN IM Nail and/or size can be selected at any time during the procedure by choosing the Implant option from the drop down menu OR by pressing the implant tab located in the lower left corner of the navigation screen.

Surgical procedure – after IM Nail Assembly to the Drill Guide

Drill sleeve attachment

Tightly secure the selected drill sleeve to the Targeter.



Note The short, long, and long combo drill sleeves (7169-2805, 7169-2804, and 7169-1166) can be loosened from the Targeter using the slot in the TRIGEN® Hammer (7167-4082).

Nail insertion

Remove Entry Tube and Handle

Remove the Anterior Drop and attach the Cannulated Impactor-Medium (7167-5081) to the drill guide. Orient the drill guide assembly in the AP position and advance the nail over the guide rod by light blows from the Slotted Hammer (7167-4082) to the desired depth.

Additional reaming of the intramedullary canal may be indicated if excessive force is required to insert the nail.

Verify fracture reduction as the nail crosses the fracture site by paying close attention to rotation, length, alignment, distraction and/or shortening. Check final nail position in both the AP and lateral views for correct alignment.

Tip Provisional fixation of the proximal tibial fragments may be obtained by reattaching the Anterior Drop and by inserting the gold 9.0mm Drill Sleeve (7163-1152) and silver 4.0mm Drill Sleeve (7167-4083) into one of the two Blocking Screw holes in the Drop and passing a 4.0mm Long Pilot Drill (7163-1110)*.



* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)

Check nail depth

Proximal

In the lateral view, confirm nail position by observing the notch present at the nail/drill guide junction. If compression or dynamic locking is desired, it is recommended to countersink the nail approximately 10mm to avoid implant prominence.



Distal

In the AP and lateral views, confirm that the nail has been inserted to the desired depth. Distal third tibial fractures require at least three locking screws to maintain stability, so optimal insertion depth is essential. Remove the Guide Rod once the nail has been fully seated and attach the Anterior Drop.



Note Following nail insertion, confirm that the nail and drill guide are securely connected as hammering can loosen the Guide Bolt.

Tip For additional confirmation of the proximal location of the nail, take the 3.2mm Guide Pin and place under the base of the drill guide where the drop would be connected and press to skin. The base of the drill guide and end of the nail are in line.

With the Guide Pin in position, take a lateral radiograph. This will give you a good idea of the location.



Items to target and drill distal holes



Trauma Interface
Cat. No. 7169-2802

Power Cord
Cat. No. 6680-0193



Inner Drill Sleeve, Long
Cat. No. 7169-1165



Outer Screw Sleeve, Long
Cat. No. 7169-1166



Drill Sleeve, Long
Cat. No. 7169-2804



Drill Sleeve, Short
Cat. No. 7169-2805



TRIGEN° SURESHOT° Targeter
Cat. No. 7169-2801



AO Drill Bit, Short
Cat. No. 7169-2810

AO Drill Bit, Long
Cat. No. 7169-2811



META-NAIL° Semi-Extended Drill Guide Probe
Cat. No. 7169-2803



META Set Stop
Cat. No. 7169-2806

Note When the targeter is out of the preferred range or there is metal or electrical interference, the green and red targeter circles on the Trauma Interface screen may become unstable and/or a warning message will be displayed. If the interference is excessive, the IM nail image on the Trauma Interface screen will disappear. If interference cannot be avoided, a standard X-Ray technique must be used.

Note All tool cables should be uncoiled completely and any excess cables should be kept out of the targeter measurement volume.

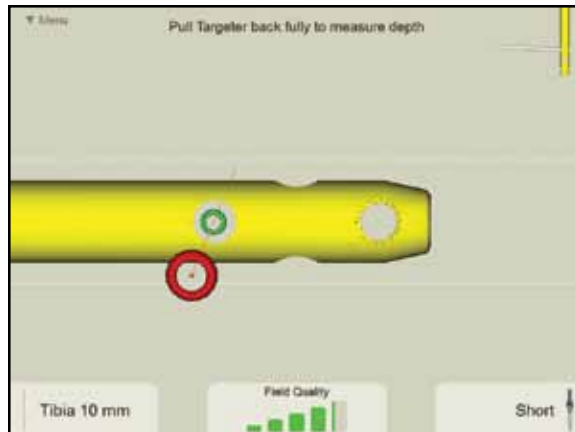
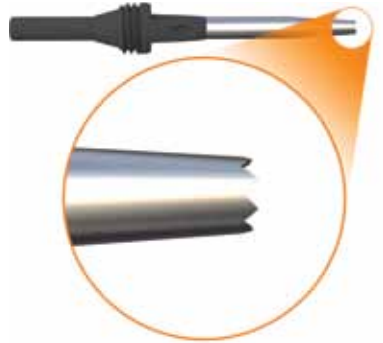
Detach Cannulated Impactor-Medium (7167-5081) from drill guide. Reattach META Set Stop (7169-2806) and insert META-NAIL® Standard Drill Guide Probe (7169-2814) in the nail. Adjust probe to nail length.

Skin incision

Use serrated tip of Drill Sleeve to identify where to make incision. The tip is at the right position when the green circle is aligned with the desired hole on screen.

Make incision and place tip of the drill sleeve down to bone where the green circle is aligned directly over the hole on screen.

Note No X-Rays necessary.



Targeting the locking hole

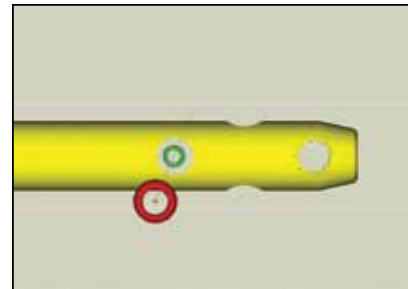
With the appropriate length TRIGEN® SURESHOT® 4.0mm Drill Bit (7169-2810 or 7169-2811) inserted into the targeter, insert the tip of the drill sleeve (represented by the green circle) through the incision and down to bone.



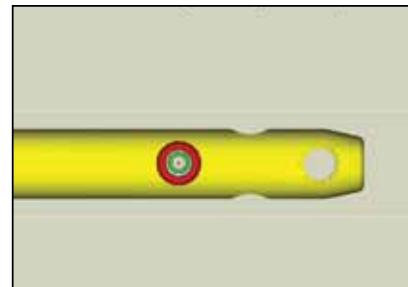
Critical Verify there are no other metal objects (including metal triangles) in the field. Metal interference will cause the system to be inaccurate.

Perfect circles

Align the tip of the drill sleeve over the desired hole in the nail. This will be represented on the screen when the green circle is centered in the hole as shown. Push serrated tip firmly against bone to keep the green circle static on the screen.



Adjust the trajectory (represented by red line between two circles) of the red circle until both circles are concentric and centered with the desired hole on the screen. Then start drilling.



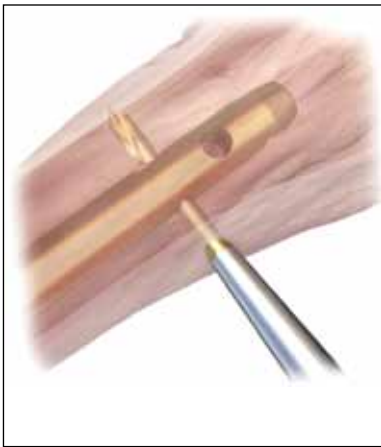
Note The green ring must be fully within the hole of the IM nail displayed on the Trauma Interface screen to ensure accurate drilling.

Drilling distal hole

Drill through near cortex and the nail using the TRIGEN® SURESHOT® 4.0mm Drill Bit (7169-2810 or 7169-2811). Before drilling through far cortex, obtain the screw measurement.

Note Important: if standard 4.0mm drill from TRIGEN set is used, magnetic metal can adversely affect accuracy causing the drill to miss. Verify there is no other magnetic metal object in area other than the items shown.

A note will appear on screen warning of compromised targeting field, if magnetic metal is close. If it is in the field, image disappears.



Drill Depth Measurement

Refer to User Manual Page 16 and 17 for drill depth measurements.

Screw insertion

Using the TRIGEN® SURESHOT® Hexdriver (7169-2809), the screw may be inserted using the Targeter.

WARNING The standard TRIGEN Hexdrivers are made from magnetic stainless steel that will cause interference with the system and cannot be used.



Using the Combo Drill Sleeve

TRIGEN SURESHOT Inner Drill Sleeve, Long
Cat. No. (7169-1165)



TRIGEN SURESHOT Outer Screw Sleeve, Long
Cat. No. (7169-1166)



1. While holding the Targeter to bone, remove the SURESHOT Inner Drill Sleeve-Long (7169-1165) from the SURESHOT Outer Screw Sleeve-Long (7169-1166).
2. Use the TRIGEN SURESHOT Hexdriver (7169-2809) to insert the appropriate length screw through the SURESHOT Outer Screw Sleeve-Long.
3. When screw insertion is complete, remove the probe from the IM nail.

Instruments for standard, dynamic and compression locking



Screw Length Sleeve
Cat. No. 7167-4085



META-NAIL® Anterior Drop
Cat. No. 7165-4501



Nail Cap Set Screw
Cat. No. 7165-6000



Medium Hexdriver
Cat. No. 7163-1066



Mini Connector
Cat. No. 7163-1186



4.0mm Drill Sleeve
Cat. No. 7167-4083



Universal META-NAIL Compression Driver
Cat. No. 7165-4528



9.0mm Drill Sleeve
Cat. No. 7163-1152



Screw Depth Gauge
Cat. No. 7163-1189



4.0mm Long Pilot Drill*
Cat. No. 7163-1110



4.0mm Short Drill**
Cat. No. 7163-1117



T-handle
Cat. No. 7167-4076



Screwdriver Release
Cat. No. 7167-4084

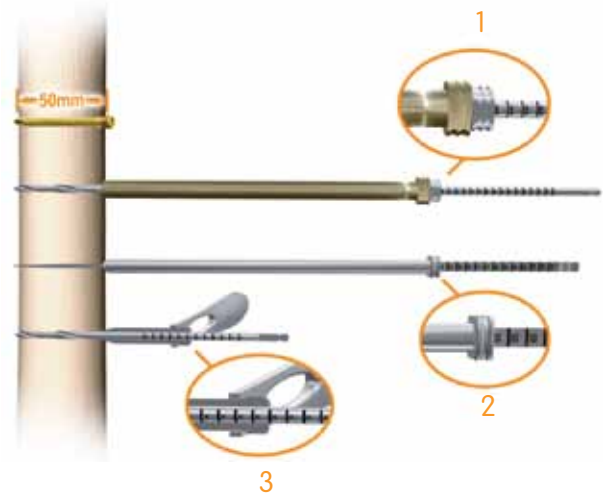
* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)

** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)

Locking screw measurement

There are three methods:

- 1 Gold 9.0mm Drill Sleeve, silver 4.0mm Drill Sleeve and 4.0mm Long Pilot Drill*.
- 2 Screw Depth Gauge (7163-1189).
- 3 Screw Length Sleeve (7167-4085) and 4.0mm Short Drill (7163-1117)**.



Locking screw insertion

Proximal locking options include three statically locked threaded holes and one slot that allows for both fracture compression and/or dynamization. These are targeted through the orange and blue color-coded holes on the Anterior Drop.

Distal locking options include three statically locked holes, two ML and one AP. The most distal ML hole is threaded for additional stability.

Gold 5.0mm locking screws are compatible with 10mm, 11.5mm and 13mm diameter nails and grey 4.5mm locking screws with 8.5mm diameter nails.

Note Do not use the 4.0mm Short Step Drill (7164-1123) when drilling for a grey 4.5mm locking screw. Its diameter transitions from 4.0mm to 4.7mm and will drill too large a hole in the near cortex. This may compromise locking screw purchase.



Final image of the META-NAIL[®] Tibial Nail with all four proximal screws inserted.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)

** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)

Note Make sure to remove probe before proximal locking.

Proximal locking: Static

Make a small incision at the site of screw entry and insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve through the static slot on the Anterior Drop down to bone. Drill both cortices with the 4.0mm Long Pilot Drill*.

Measure for screw length using either the calibrations on the 4.0mm Long Pilot Drill* or by removing the 4.0mm Drill Sleeve and using the Screw Depth Gauge. Attach the appropriate length screw to the end of the Medium Hexdriver (7163-1066) and insert through the gold 9.0mm Drill Sleeve on power until the laser etched ring on the Hexdriver reaches the back of the drill sleeve. Attach the T-handle to the Hexdriver and tighten the screw by hand.



Proximal locking: Dynamic

With the nail countersunk approximately 10mm, make a small incision at the site of screw entry and insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve through the dynamic slot on the Anterior Drop down to bone. Drill both cortices with the 4.0mm Long Pilot Drill*. Screw measurement and insertion follows the previously described technique.



Note Use the “TIBIA” and “ALL NAILS” holes marked on the META-NAIL[®] drop.

Note If nail is left in dynamic mode, a nail cap cannot be used, as it will push against the locking screw.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)

Proximal locking: Compression

There are two (2) methods:

Compression Driver method

- 1 Countersink the nail a minimum of 10mm and lock the nail distally.
- 2 Reduce the fracture as much as possible to maximize the advantage of the compression driver.
- 3 Insert a screw through the proximal side of dynamic slot as previously described.
- 4 Remove the gold 9.0mm Drill Sleeve and Medium Hexdriver.
- 5 Attach the Universal Compression Driver (7165-4528) to the T-handle and thread it through the guide bolt into the top of the nail until it contacts the most proximal 5.0mm locking screw.
- 6 Advance the Compression Driver clockwise to drive the locking screw distally which will compress the fracture up to 7mm.
- 7 Once the fracture gap is adequately compressed, lock the nail with up to three additional proximal static screws while the Anterior Drop is still attached to the drill guide.



Nail Cap Set Screw method

Lock the nail distally, fully insert the dynamic locking screw as previously described and remove the Drill Guide/Anterior Drop assembly. Insert the Nail Cap Set Screw (7165-6000) into the top of the nail and advance with the Medium Hexdriver/T-handle assembly until the fracture is compressed and the Nail Cap Set Screw has fully engaged the locking screw.

Note If the Compression Driver is progressed after the fracture is fully compressed, then the locking screw will begin to bend. In extreme cases where excess force is applied, the screw may break upon removal.

Note For additional information on Blocking Screws, reference the TRIGEN® META-NAIL® Tibial Nail Surgical Technique.



Instruments for implant removal



3.2mm Tip Threaded Guide Wire

Cat. No. 7163-1690



12.5mm Entry Reamer

Cat. No. 7163-1116



Mini Connector

Cat. No. 7163-1186



Disposable Nail Extractor***

Cat. No. 7163-1320



Cannulated Impactor-Medium

Cat. No. 7167-5081



Cannulated Impactor-Long**

Cat. No. 7163-1185



3.0mm x 1000mm Ball Tip Guide Rod*

Cat. No. 7163-1626



Slotted Hammer

Cat. No. 7167-4082



T-handle

Cat. No. 7167-4076



Medium Hexdriver

Cat. No. 7163-1066

* Additional Guide rods listed on page 46

** The Cannulated Impactor-Long is located in the original TRIGEN® Instrument Set (7163-1326)

*** The Disposable Nail Extractor (7163-1320) is interchangeable with the Large Nail Extractor (7163-1278) located in the original TRIGEN Instrument Set (7163-1326) and the HFN® Instrument Set (7170-0001)

Nail extraction: optional

Standard technique

Remove the Nail Cap or Nail Cap Set Screw if implanted and all of the distal locking screws with the Medium Hexdriver/T-Handle assembly. Remove all of the proximal locking screws except for one in the same manner.

Thread the Cannulated Impactor-Medium (7167-5081) or Cannulated Impactor-Long (7163-1185)* into the back of the Disposable Nail Extractor (7163-1320)** and then thread the assembly into the top of the nail. Remove the remaining proximal locking screw and then extract the nail with a back-slapping motion using the Slotted Hammer.



Percutaneous technique

This technique assumes the absence of a Nail Cap or Nail Cap Set Screw. Remove all distal locking screws and all but one of the proximal locking screws as previously described. Under fluoroscopy, insert a 3.2mm Tip Threaded Guide Wire (7163-1690) into the top of the nail on power or by hand. Make a 2cm incision around the pin and advance the 12.5mm Entry Reamer over the pin and into the top of the nail to remove any bony ingrowth.



Thread the Cannulated Impactor-Medium or Cannulated Impactor-Long* (7163-1185) into the back of the Disposable Nail Extractor** (7163-1320) and then thread the assembly into the top of the nail. Remove the remaining proximal locking screw and then extract the nail with a back-slapping motion.



Note The tip of the Entry Reamer is straight for approximately 1cm before flaring out. It is this portion of the Entry Reamer that enters the top of the nail.

* The Cannulated Impactor-Long is located in the original TRIGEN® Instrument Set (7163-1326)

** The Disposable Nail Extractor (7163-1320) is interchangeable with the Large Nail Extractor located in the original TRIGEN® Instrument Set (7163-1326) and the HFN® Instrument Set (7170-0001)

An alternative method for extraction

Guide rod jamming technique

Advance the end of a 3.0mm Ball Tip Guide Rod through the end of the nail. Insert a 2.0mm Smooth Guide Rod (7111-8280) in the same manner. With both guide rods in place, attach the Gripper to the end of the 3.0mm Ball Tip Guide Rod and pull it back so that it wedges the ball tip against the 2.0mm Smooth Guide Rod. Backslap against the Gripper with the Slotted Hammer to extract the nail.

Guide rods

Cat. No.	Description
7111-8280	2.0mm x 900mm Smooth (RUSSELL-TAYLOR® System)*
7111-8202	3.0mm x 900mm Ball Tip (RUSSELL-TAYLOR System)*
7163-1626	3.0mm x 1000mm Ball Tip (TRIGEN® System)

Additional removal items

Cat. No.	Description
115074	Large Extractor Hook*
115073	Small Extractor Hook*
914658	Large Easy Out**
914659	Small Easy Out**

* Available sterile packed. For nail removal only, do not use for nail insertion

** Located in RUSSELL-TAYLOR Extraction Kit (Set #7508) available through Loaners

Catalog information – TRIGEN[®] META-NAIL[®] Implants

TRIGEN Internal Captured Screws 4.5mm and 5.0mm

Set No. 7163-1321

Cat. No.	Length	Cat. No.	Length
7164-2125	4.5mm x 25mm	7164-2225	5.0mm x 25mm
7164-2130	4.5mm x 30mm	7164-2230	5.0mm x 30mm
7164-2135	4.5mm x 35mm	7164-2235	5.0mm x 35mm
7164-2140	4.5mm x 40mm	7164-2240	5.0mm x 40mm
7164-2145	4.5mm x 45mm	7164-2245	5.0mm x 45mm
7164-2150	4.5mm x 50mm	7164-2250	5.0mm x 50mm
		7164-2255	5.0mm x 55mm
		7164-2260	5.0mm x 60mm
		7164-2265	5.0mm x 65mm
		7164-2270	5.0mm x 70mm
		7164-2275	5.0mm x 75mm



4.5mm



5.0mm

TRIGEN META-NAIL 8.5mm Tibial

Set No. 7165-3002

Cat. No.	Length	Cat. No.	Length
7165-5024*	24cm	7165-5035*	35cm
7165-5026*	26cm	7165-5036*	36cm
7165-5028*	28cm	7165-5037*	37cm
7165-5029	29cm	7165-5038*	38cm
7165-5030*	30cm	7165-5039	39cm
7165-5031	31cm	7165-5040	40cm
7165-5032*	32cm	7165-5041	41cm
7165-5033*	33cm	7165-5042	42cm
7165-5034*	34cm		



*Contained in the standard implant set

Catalog information – TRIGEN[◇] META-NAIL[◇] Implants

TRIGEN META-NAIL 10mm Tibial

Set No. 7165-3000

Cat. No.	Length	Cat. No.	Length
7165-5124	24cm	7165-5135*	35cm
7165-5126	26cm	7165-5136*	36cm
7165-5128*	28cm	7165-5137*	37cm
7165-5129	29cm	7165-5138*	38cm
7165-5130*	30cm	7165-5139*	39cm
7165-5131	31cm	7165-5140*	40cm
7165-5132*	32cm	7165-5141	41cm
7165-5133	33cm	7165-5142	42cm
7165-5134*	34cm		



TRIGEN META-NAIL 11.5mm Tibial

Set No. 7165-3001

Cat. No.	Length	Cat. No.	Length
7165-5224	24cm	7165-5235*	35cm
7165-5226	26cm	7165-5236*	36cm
7165-5228	28cm	7165-5237*	37cm
7165-5229	29cm	7165-5238*	38cm
7165-5230*	30cm	7165-5239*	39cm
7165-5231	31cm	7165-5240*	40cm
7165-5232*	32cm	7165-5241	41cm
7165-5233	33cm	7165-5242	42cm
7165-5234*	34cm		



* Contained in the standard implant set

TRIGEN® META-NAIL® 13mm Tibial

Cat. No.	Length
7165-5318	18cm
7165-5320	20cm
7165-5322	22cm
7165-5324	24cm
7165-5326	26cm
7165-5328	28cm
7165-5329	29cm
7165-5330	30cm
7165-5331	31cm
7165-5332	32cm
7165-5333	33cm
7165-5334	34cm

Cat. No.	Length
7165-5335	35cm
7165-5336	36cm
7165-5337	37cm
7165-5338	38cm
7165-5339	39cm
7165-5340	40cm
7165-5341	41cm
7165-5342	42cm
7165-5343	43cm
7165-5344	44cm
7165-5346	46cm
7165-5348	48cm
7165-5350	50cm



Nail Cap Set Screw

Cat. No. 7165-6000



TRIGEN Nail Caps

Cat. No.	Length
7163-4000	0mm
7163-4005	5mm
7163-4010	10mm

Cat. No.	Length
7163-4015	15mm
7163-4020	20mm



Catalog Information – TRIGEN® META-NAIL® Instruments

TRIGEN META-NAIL Blocking Screw Instruments

Set No. 7165-4001

Blocking Screw Device

Cat. No. 7165-4515



Tibial Blocking Screw Attachment

Cat. No. 7165-4509



11.0mm T-handle Awl

Cat. No. 7165-4522



8.5mm/10mm Blocking Screw Cartridge

Cat. No. 7165-4511



11.5mm/13mm Blocking Screw Cartridge

Cat. No. 7165-4513



Offset Blocking Screw Cartridge

Cat. No. 7165-4514



Blocking Screw Alignment Pin

Cat. No. 7165-4523



Blocking Screw Instrument Case

Cat. No. 7165-4552

Blocking Screw Instrument Lid

Cat. No. 7165-4553



Instruments used if you have TRIGEN[®] Base Set

Set No. 7167-4012

Medium Hexdriver

Cat. No. 7163-1066



Short Hexdriver

Cat. No. 7163-1068



12.5mm Entry Reamer

Cat. No. 7163-1116



Guide Bolt Wrench

Cat. No. 7163-1140



9.0mm Drill Sleeve

Cat. No. 7163-1152



Multipurpose Driver

Cat. No. 7163-1161



Mini Connector

Cat. No. 7163-1186



Screw Depth Gauge

Cat. No. 7163-1189



Cannulated Awl

Cat. No. 7167-4000



Entry Portal Tube

Cat. No. 7167-4060



3.2mm T-handle Trocar

Cat. No. 7167-4074



Honeycomb

Cat. No. 7167-4075



Flexible Reamer Shaft

Cat. No. 7111-8200



Reamer Heads

Cat. No. 7111-8231-8246



T-handle

Cat. No. 7167-4076



Reducer

Cat. No. 7167-4077



Obturator

Cat. No. 7167-4078



Ruler

Cat. No. 7167-4079



Gripper

Cat. No. 7167-4080



Cannulated Impactor-Medium

Cat. No. 7167-5081



Slotted Hammer

Cat. No. 7167-4082



4.0mm Drill Sleeve

Cat. No. 7167-4083



Screwdriver Release

Cat. No. 7167-4084



Screw Length Sleeve

Cat. No. 7167-4085



Entry Portal Handle

Cat. No. 7167-4092



Instruments used if you have existing TRIGEN[®] set

Set No. 7163-1326

Medium Hexdriver

Cat. No. 7163-1066



Short Hexdriver

Cat. No. 7163-1068



Gripper

Cat. No. 7163-1100



Entry Tool

Cat. No. 7163-1114



12.5mm Entry Reamer

Cat. No. 7163-1116



Obturator

Cat. No. 7163-1122



Reducer

Cat. No. 7163-1124



Ruler

Cat. No. 7163-1128



Guide Bolt Wrench

Cat. No. 7163-1140



Hammer

Cat. No. 7163-1150



9.0mm Drill Sleeve

Cat. No. 7163-1152



4.0mm Drill Sleeve

Cat. No. 7163-1156



Multipurpose Driver

Cat. No. 7163-1161



T-handle

Cat. No. 7163-1172



Catalog information – TRIGEN[®] META-NAIL[®] Instruments

Mini Connector

Cat. No. 7163-1186



Screw Depth Gauge

Cat. No. 7163-1189



Screw Driver Release Handle

Cat. No. 7163-1208



Cannulated Impactor-Long

Cat. No. 7163-1185



Flexible Reamer Shaft

Cat. No. 7163-1192



Reamer Heads

Cat. No. 7111-8231-8242



META-NAIL Disposables

Set No. 7165-4003

4.0mm Long Pilot Drill*

Cat. No. 7163-1110



4.0mm Short Drill**

Cat. No. 7163-1117



3.0mm x 1000mm Ball Tip Guide Rod

Cat. No. 7163-1626



3.2mm Tip Threaded Guide Wire

Cat. No. 7163-1690



Universal Compression Driver

Cat. No. 7165-4528



Disposable Nail Extractor***

Cat. No. 7163-1320



* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)

** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)

*** The Disposable Nail Extractor (7163-1320) is interchangeable with the Large Nail Extractor (7163-1278) located in the original TRIGEN Instrument Set (7163-1326) and the HFN[®] Instrument Set (7170-0001)

Catalog information – TRIGEN[®] SURESHOT[®] Instruments

TRIGEN SURESHOT Targeting Interface

Cat. No. 7165-7000

Cat. No.	Device	Case Qty
7169-2802	Trauma Interface	1



TRIGEN SURESHOT Targeting Instrument Set

Set No. 7165-7001

Cat. No.	Description	Tray Qty
7169-2801	Targeter	1
7169-2804	Drill Sleeve - Long	2
7169-2805	Drill Sleeve - Short	2
7169-2806	META Set Stop	1
7169-2807	TAN [®] Set Stop	1
7169-2808	Field Accuracy Gauge	1
7169-2809	Hexdriver	1
7169-2816	TAN Anteversion Locking Guide	1
7169-2830	Targeting Instrument Tray	1
7169-2831	Targeting Instrument Tray Lid	1



Other TRIGEN SURESHOT Instruments

Cat. No.	Description	Qty
7169-1165	Inner Drill Sleeve, Long	1
7169-1166	Outer Screw Sleeve, Long	1

TRIGEN SURESHOT Targeting Disposables Set

Set No. 7165-7002

Cat. No.	Description	Qty
7169-2810	AO Drill Bit, Short	2
7169-2811	AO Drill Bit, Long	1



Additional Disposables

Cat. No.	Device
7169-2803	META-NAIL [®] Semi-Extended Drill Guide Probe (used with TRIGEN META-NAIL Nail Instrument Set, 7165-4002)



Catalog information – TRIGEN[®] SURESHOT[®] Instruments

TRIGEN SURESHOT Country Kit – North America

Cat. No. 7165-7003

Cat. No.	Description	Qty
6680-0193	Power Cord, 125 Volt 10 Amp – North America (Hospital Grade)	1
7118-1540	User Manual, English	1

Additional country kits

TRIGEN SURESHOT Country Kit – Australia

Cat. No. 7165-7004

Cat. No.	Description	Qty
6680-0303	Power Cord, 250 Volt 10 Amp – Australia/NZ	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – Continental Europe

Cat. No. 7165-7005

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – Germany

Cat. No. 7165-7006

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1538	User Manual, German	1

TRIGEN SURESHOT Country Kit – Spain

Cat. No. 7165-7007

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1539	User Manual, Spanish	1

TRIGEN® SURESHOT® Country Kit – France

Cat. No. 7165-7008

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1537	User Manual, French	1

TRIGEN SURESHOT Country Kit – Italy

Cat. No. 7165-7009

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1536	User Manual, Italian	1

TRIGEN SURESHOT Country Kit – United Kingdom

Cat. No. 7165-7011

Cat. No.	Description	Qty
6680-0213	Power Cord, 250 Volt 10 Amp – UK	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – South Africa/India

Cat. No. 7165-7012

Cat. No.	Description	Qty
6680-0302	Power Cord, 250 Volt 10 Amp – So. Africa/India	1
7118-1540	User Manual, English	1

For additional information on Blocking Screws and Extraction Techniques, please reference the TRIGEN® META-NAIL® Tibial Nail Surgical Technique, 7118-1610.

Smith & Nephew, Inc.

7135 Goodlett Farms Parkway
Cordova, TN 38016
USA

www.smith-nephew.com

Telephone: 1-901-396-2121
Information: 1-800-821-5700
Orders/Inquiries: 1-800-238-7538